DOCUMENT RESUME

ED 299 483 CG 021 128

AUTHOR Perkins, Kyle; And Others
TITLE The Use of Achievement Test Results in Elementary School Guidance and Counseling.
PUB DATE 86
NOTE 14p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Achievement Tests; Counseling Services; Curriculum Development; Elementary School Students; *Grade 6; Intermediate Grades; Learning Processes; *School Counseling; *Standardized Tests; *Test Use

ABSTRACT

Achievement test results, in combination with other data, are used to help guidance counselors plan students' future educational programs to the extent that such data assist school personnel in grouping students for optimal instructional benefits. Implementation of such plans may require fitting the curriculum to the student. Two types of schemata are important to learning as it relates to the use of achievement tests: (1) content schemata, or previously learned background mental structures which form cognitive maps and are active in the generation of expectancies of knowledge that one object or event will follow another; and (2) formal schemata which are those previously learned skills students use to manage learning, remembering, and thinking. This study sought to identify the latent variables measured by a standardized achievement test. Subjects were members of the sixth-grade class in a midwestern school district. Item responses were analyzed from the Iowa Tests of Basic Skills, Form G, Level 12. Results of the study indicated that this sample of students all had similar levels of prerequisite skills in the areas assessed, and therefore there should not be any disparities in their adaptation and cognitive modes for these subject matters during their seventh-grade instruction. There were no indications that modifications to next year's curriculum would be necessary to fit the curriculum to the students. (ABL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED299483

The Use of Achievement Test Results in Elementary School Guidance and Counseling

Kyle Perkins
Southern Illinois University

John T. Pohlmann
Southern Illinois University

Ann Duncan, Principal
Carterville (IL) Grade School

CG 021128

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Kyle Perkins

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

The Use of Achievement Test Results in Elementary School Guidance and Counseling

Abstract

This paper illustrates how to identify the content schemata and cognitive modes underlying achievement test results in order to determine whether/how the future curriculum must be modified to fit the students.

INTRODUCTION

The purpose of this paper is to explore how achievement test results can be used in educational guidance and counseling. In typical fashion, achievement test results, in combination with other data, are used to help guidance counselors plan students' future educational programs to the extent that such data assist school personnel in grouping students for optimal instructional benefits. Implementation of such plans may entail modification of the instructional methodology or the reteaching of certain material, that is, fitting the curriculum to the student.

In this paper we want to pursue what can be accomplished with achievement test results by guidance and counseling personnel when the cognitive structures underlying achievement tests are considered and when future learning is viewed as an instantiation of human adaptation.

According to Horton and Mills (1984), information is preserved and organized in cognitive structures which are referred to as schemata. Cognitive structures or schemata are mental representations of objects and of the relationship among them. These mental structures constitute the organization of students' knowledge and allow them to retrieve information from memory. Cognitive structures, schemata, and cognitive maps which underlie achievement test results are important tools for guidance personnel to use because, when students learn, they form a type of cognition which represents the expectation that one object or event will follow another. The cognitive structures which have been acquired, as manifested by the achievement test results, can form the basis for planning the students' future eductional programs.

Learning can be viewed as an example of human adaptation, or changes in behavior which permit us to solve problems. These changes in behavior are in response to various types of internal and external stimuli. Adaptation-level theory which was proposed by Helson (1964), acknowledges three modes or domains: the biophysical, the psychosocial, and the cognitive. The latter mode is concerned with persons' comprehension and what is occurring in their world. The cognitive mode, according to Hames (1978), examines the nature of the stimuli that influence students' learning and perception. The two types of stimuli which are of principal interest to guidance counselors planning students' future educational programs are focal and contextual stimuli. Focal stimuli are the most immediate to the student (e.g., current instruction), while background

stimuli, originating in the internal or external environment, concurrently exert an influence upon the students' behavior (e.g., previous learning and instruction).

In addition, there are three interrelated concepts which merit consideration because they pertain to the subject of this paper. They are Gestalt or cognitive-field, learning readiness, and learned capabilities categories. The Gestalt or cognitive-field theory of learning holds that learning is equated with students' relating new concepts and experiences to their present "fields" by reorganization of their perception and comprehension of concepts and things.

Erikson (1963), in a discussion of psychological development and maturity, has noted that one indication of students' learning readiness is that they are cognitively mature enough to relate knowledge and perceptions and to use both to compose new behaviors.

Gagne (1977) proposed five major categories of learned capabilities: intellectual skills, verbal information, cognitive strategies, motor skills, and attitudes. Of the five, the first three are more directly germane to the interpretation and use of achievement test results. According to Gagne, the learning of intellectual skills is dependent upon "the recall of prerequisite skills which are components of the new skills to be learned. The learning of verbal information depends upon the recall of internally stored complexes of ideas which constitute 'meaningfully organized' structures. Cognitive strategies require the recall of intellectual skills

and information relevant to the specific learning tasks being undertaken" (pp. 48-49).

The preceding paragraphs have presented an overview of learning as it relates to the use of achievement test results by guidance and counseling personnel. Basically, this overview has indicated that two types of schemata are involved: content schemata are previously learned background mental structures which form cognitive maps and are active in the generation of expectancies of knowledge that one object or event will follow another, and what we shall call formal schemata which are those previously learned skills students use to manage learning, remembering, and thinking. Gagne noted that such skills entail the recall of intellectual skills and relevant information specific to the learning task being undertaken. Learning is seen as a change in response to stimuli from the students' internal and external stimuli.

THE PRESENT STUDY

Purpose

The purpose of this paper is to demonstrate how achievement test results can be used to plan students' future educational programs in the context of how learning has been treated in this paper. Specifically, the purpose was to identify the latent variables measured by a standarized achievement test on which a sample of sixth-grade students displayed similar

relative performance. If achievement test results are to be used to group students for optimal instructional benefits, then the previously learned knowledge structures must be identified because the most important internal condition for the learning of intellectual skills is the recall of prerequisite skills which are components of the new skills, the focus of future instruction.

Subjects

The subjects who generated the data for this research were the sixth-grade class from a midwestern, municipal school district. The data analyzed in this study were collected during the spring as a part of the school's assessment program when standardized achievement tests are administered.

Instrumentation

Item responses were analyzed from the following Iowa Tests of Basic Skills Form G, Level 12 (Hieronymus, Hoover, and Lindquist, 1986) subtests: Vocabulary; Reading Comprehension; Language Skills: Spelling, Capitalization, Punctuation, Usage and Expression; and Work-Study Skills: Visual Materials and Reference Materials.

The following descriptions of the subtests were taken from the Preliminary Teacher's Guide (Hieronymus, Hoover,

and Lindquist, 1986).

The Vocabulary test measures both the extent or breadth of vocabulary and the ability to make fine distinctions in word meaning (p. 41).

The sixteen skills objectives represented in the Reading Comprehension test are classified into three major divisions: facts-to recognize and understand stated factual details and relationships; inferences-to infer underlying relationships; generalizations-to develop generalizations from a selection (p. 45).

The Spelling subskills assessed include consonant substitutions; consonant reversals; omission of consonants; addition of unnecessary consonants; double consonants; vowel substitutions; vowel reversals; omission of vowels; and addition of unnecessary vowels.

The Punctuation skills objectives include the use of terminal punctuation, the use of comma, the use of apostrophe, quotation marks, colon, and semicolon; and the use of punctuation where none is required.

The following Usage and Expression skills objectives were tested: the use of verbs; the use of personal pronouns; the use of modifiers; the use of context; conciseness and clarity; appropriateness; and organization.

The Visual Materials skills objectives were concerned with map-reading skills and interpreting graphic and tabular displays of information skills.

The Reference Materials skills objectives were alphabetizing,

using a table of contents, an index, a dictionary, encyclopedias, guide words, key words, and general reference materials.

Analysis

The data, in the form of item scores from each item from the previously mentioned ITBS subtests, were submitted to factor analysis. In brief, the purpose of factor analytic techniques is to determine whether there are one or more clusters of tests on which examinees display similar relative performances. The output of a factor analysis is the identification of the number of common factors (latent or unobservable variables) necessary to account for the correlation pattern between all pairs of tests in an assessment battery. A factor loading for a particular test on a particular common factor indicates the relationship between the test scores and the common factor scores.

RESULTS AND DISCUSSION

(Put Table 1 about here)

Table 1 presents the means, standard deviations, and estimates of reliability for the eight ITBS subtests. The reliability coefficients were estimated by the Kuder-Richardson Formula 20 method.

The students' item scores on the eight ITBS subtests

(Vocabulary, Reading Comprehension, Spelling, Capitalization, Punctuation, Usage and Expression, Visual Materials, and Reference Materials) were intercorrelated (all correlations were significant at the .0001 level), and the resulting correlation matrix was factor analyzed.

The first step of the factor analysis was to determine the number of factors. A principal components analysis of the correlation matrix yielded only one eigenvalue greater than one. A scree test on the plot of the entire series of eigenvalues also showed a steep drop to the second root and then a gradual linear decline commencing with the second eigenvalue. These results suggested that a strong one-factor structure could explain the correlations among the ITBS subtests.

(Put Table 2 about here)

The correlation matrix was then factored again using squared multiple correlations as communality estimates. A one-factor solution was requested. The factor-loadings for this one-factor solution are presented in Table 1. The one-factor solution explained 98.5 % of the common variance of the ITBS subtests. Common variance was estimated by the trace of the reduced correlation matrix.

An inspection of Table 2 indicates that there are two possible interpretations of the results. First, the factor structure resembles a reading comprehension factor because

all the subtests which load highly on this factor have reading and comprehension of what has been read as features. In addition, the strength of this one-factor solution is sizeable.

A second interpretation is that the factor structure represents a unitary achievement factor. That is, those students who achieved high scores on the Reading Comprehension subtest also achieved high scores on the Usage and Expression subtest, and vice versa. It was not the case that some students scored relatively high on one subtest and relatively low on one or more of the remaining subtests.

The results indicate that this sample of students will all have similar levels of prerequisite skills in the areas assessed, and therefore there should not be any disparaties in their adaptation and cognitive modes for these subject matters during seventh-grade instruction. That is, these students should have the same levels of background stimuli; consequently, there are no indications from these data analyses that special efforts will have to be taken to modify the seventh-grade curricula to account for deficiencies. In other words, all the students who generated data for this study all seem to have similar Gestalts, cognitive fields, and content schemata in the areas assessed; otherwise, a one-factor solution would not have obtained.

In summary, the purpose of this investigation was to identify the content schemata and cognitive modes underlying achievement test results to determine whether any modifications would be necessary to fit the next year's curriculum to the students. There was no indications that modifications should be made.

REFERENCES

Erikson, E. H. (1963). Childhood and society. New York: Norton.

Gagne, R. M. (1977). The conditions of learning (3rd edition). New York: Holt, Rinehart and Winston.

Hames, C. (1978). A theoretical framework for pediatric care: Adaptation-level theory. In P. Brandt (Ed.), Current practice in pediatric nursing. St. Louis: C. V. Mosby.

Helson, H. (1964). Adaptation-level theory. New York: Harper & Row.

Hieronymus, A. N., Hoover, H. D., and Lindquist, E. F. (1986). Iowa Tests of Basic Skills, Form G, Level 12. Chicago: The Riverside Publishing Company.

Hieronymus, A. N., Hoover, H. D., and Lindquist, E. F. (1986). Preliminary teacher's guide. Multilevel battery. Levels 9-14. Chicago: The Riverside Publishing Company.

Horton, D. L., and Mills, C. B. (1984). Human learning and memory. Annual Review of Psychology, 35, 361-394.

Table 1
Means, standard deviations, and estimates of reliability

Test	No. of items	Mean	Standard deviation	Estimate of reliability
Vocab.	41	27.73	6.03	.772
Read. Comp.	56	40.26	8.74	.869
Spell.	41	27.56	7.41	.857
Capital.	26	22.21	4.63	.882
Punct.	26	21.23	4.79	.864
Usage and Express.	40	30.06	5.75	.797
Visual Materials	45	29.69	6.95	.807
Ref. Materials	41	32.56	6.08	.839

Table 2
Factor loadings of the ITBS subtests from a one-factor solution

ITBS subtest	Factor loading
Vocabulary	.777
Reading Comprehension	.847
Spelling	.703
Capitalization	.698
Punctuation	.783
Usage and Expression	.864
Visual Materials	.796
Reference Materials	.874
Percent of Trace	98.5